

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

The above amendments to the claims merely amend independent claims 1 and 6 so as to include recitations of their dependent claims 11 and 7, respectively. Accordingly, entry of these amendments, which do not introduce any "new issue," is believed to be appropriate under 37 C.F.R. §1.116.

The Examiner's indication that claims 8-10 will be given full consideration if, at some point, generic claim 6 is found allowable is appreciatively noted. It is respectfully requested that claim 5 be given the same consideration if its parent claim 1 is found allowable.

The rejection of claim 1 under 35 U.S.C. §103 as allegedly being made "obvious" based on the applicant's admitted prior art (AAPA) in view of Takahashi '744 is respectfully traversed.

The Examiner's reliance on "AAPA" at pages 1-3 of the specification is puzzling. Of course, this background section of the specification admits that it is well known and conventional to make shim coils. MRIS systems have been around for quite some number of years and they have typically employed shim coils of various designs – but not by use of methodology now claimed as invention by the applicant.

Indeed, if the Examiner is going to give weight to the AAPA described at pages 1-3 of the specification, then it is respectfully submitted that weight must be given to the teaching therein that a number of less advantageous methods were known in the prior art for fabricating shim coils – including the use of photo-etching and of winding using insulated conductors. The Examiner's allegation that "the AAPA does not necessarily say how the shim coil is manufactur[ed]" is inaccurate. The AAPA does, in fact, describe prior art techniques for manufacturing a shim coil; namely, photo-etching and the formation of windings using insulator conductors. This aspect of the AAPA should not be simply ignored.

Amended independent claims 1 and 6 each claim a method for making an electrical MRIS shim coil in which an initial punching step leaves bridging portions between adjacent cut lengths of conductor within the coil windings. Further, these bridges are maintained in place while the windings are attached to an insulating substrate – and only after attachment to the substrate are the bridges removed.

The inclusion of such method steps allows the production of large-scale, accurately produced windings of the type required for MRIS shim coils. At the same time, it yields a cost-effective and efficient manufacturing process.

Takahashi describes a process for forming a gradient coil using a stamping process. Note that this process is a one-step process using a die and, moreover, it relates to the production of gradient coils rather than shim coils.

Most importantly, bearing in mind the scope of the amended claims, Takahashi in no way describes or suggests the use of bridging portions to help accurately manufacture the resulting coil. As a result of not including bridge in the coils of Takahashi, there will be increased handling difficulties in transferring the punched coil to the insulating substrate and an increased likelihood of the coils being displaced relative to one another which can have an adverse effect on the field pattern generated.

The applicant recognized that by punching out coil patterns, but leaving in place small bridges of material between the adjacent turns of the coil, the benefits associated with coil punching or stamping could still be achieved while reducing or minimizing problems which might arise by the inaccurate placement of the turns on an insulating substrate and the issues which arise in handling the punched coils.

The rejection of claim 3 under 35 U.S.C. §103 as allegedly being made "obvious" based on AAPA/Takahashi in further view of Nakamura '627 is also respectfully traversed.

Fundamental deficiencies of AAPA/Takahashi have already been noted above for parent claim 1. Nakamura does not supply those deficiencies. Of course, applicant understands that a CNC punch is, *per se*, well known in the prior art. However, such has not been heretofore used in the manufacture of MRIS shim coil patterns in the context of the claimed subject matter. The Examiner is respectfully reminded that the statute (35 U.S.C. §103) as well as relevant case law requires that applicant's claimed

subject matter be considered "as a whole" when considering obviousness issues. Piecemeal citation of bits and pieces from disparate prior art teachings does not in any way demonstrate even a *prima facie* case of "obviousness" under 35 U.S.C. §103.

The rejection of claim 6 under 35 U.S.C. §103 as allegedly being made "obvious" based on AAPA/Takahashi and Hoppe '198 is respectfully traversed – as is the rejection of claim 11 under 35 U.S.C. §103 as allegedly being made "obvious" based on AAPA/Takahashi in further view of LaPlante '481. Similarly, the rejection of claim 7 under 35 U.S.C. §103 as allegedly being made "obvious" based on AAPA/Takashi/Hoppe in further view of LaPlante is also respectfully traversed.

Initially, it is noted that independent claims 1 and 6 have been amended above so as to now include recitations of claims 11 and 7, respectively.

Fundamental deficiencies of AAPA/Takahashi have already been noted above. Neither Hoppe nor LaPlante satisfies those deficiencies. Indeed, as will be explained in more detail below, both of these references are either irrelevant or contrary to the invention now claimed and which the Examiner alleges to have been "obvious".

First, it is noted that neither Hoppe nor LaPlante relates to the manufacture of MRIS shim coils.

Hoppe, in particular, is related to a very different field for making tiny coils for use in card-like data carriers and so on. The problems and considerations associated with

producing large-scale MRIS shim coils will be completely different from those for creating extremely small coils for use in data carrying cards and the like. Thus, while Hoppe does relate to the formation of coils using a punching process, in general terms, the skilled person would pay little attention to that document when considering the manufacture of MRIS shim coils.

LaPlante, on the other hand, does not refer to punching coils whatsoever.

At paragraph 3 on page 5 of the office action, the Examiner asserts that LaPlante shows a coil-making process including a first punching step where bridges of material are left along the cutting paths. Applicant can find no such disclosure whatsoever in LaPlante.

LaPlante relates to a system of forming coils where, first of all, copper layers are bonded to a ceramic substrate and, after this, laser cutting is used to form a coil structure by machining away the copper sheets to leave the turns of the coil. This fundamental nature of the coils of LaPlante is made clear, for example, in the passage starting at 2:15.

Perhaps the Examiner considers that the copper sheets 101, 103 shown, for example, in Fig. 1 are punched components. However, even if this is assumed *arguendo* to be the case, then it is not true to say that a coil pattern is produced by

punching, nor can it properly be said that there are plural bridging portions between lengths of conductive material in the cut pattern.

In LaPlante, there is simply a complete sheet of copper having no coil patterns in it whatsoever which is bonded to a substrate, and only after this are the coil patterns produced – and these are produced by laser machining, not punching. Thus, LaPlante does not disclose forming a coil by punching – nor does it disclose the idea of providing temporary bridges between adjacent paths of a punched coil.

It is further noted that Hoppe also fails to disclose the provision of bridge portions ***between adjacent lengths*** of conductive material in the cut pattern of a ***coil*** and thus fails to disclose removal of any such bridges ***within a coil pattern*** – after mounting of the coil pattern on an insulating substrate.

In paragraph 2 on page 5 of the office action, the Examiner asserts that various pieces of prior art disclose removing bridging portions before attachment of a punched pattern to a substrate. While this is believed to be incorrect, it is pointed out that such a teaching, even if it exists, is, for all intents and purposes, irrelevant and useless for arriving at the presently claimed invention. It is only when the bridging portions are retained in place until the punched structure is mounted on a supporting insulating substrate that there is any benefit in their provision at all as contemplated by the present invention.

Michael Colin BEGG
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The Examiner suggests that there are various advantages associated with the coil-making process disclosed in LaPlante and, therefore, this could be used to modify, for example, the process disclosed in Takahashi. However, this again is a fallacy. The coil-making process disclosed in LaPlante is completely and utterly different from, for example, Takahashi, where the idea of punching coils is mentioned. LaPlante does not relate to a punching technique – nor is it compatible with a punching technique. To begin to use the idea of LaPlante, it is submitted that one would have to completely dismiss and stop using the ideas of Takahashi.

In the present invention, the applicant has determined and realized that the performance of shim coils and efficiency of their manufacturing may be improved by, first of all, using a punching process and then using the defined step of retaining bridges between the windings of the punched coil pattern until such time as the punched coil pattern is mounted to an insulating substrate.

Accordingly, this entire application is now believed to be in allowable condition, and a formal notice to that effect is earnestly solicited.

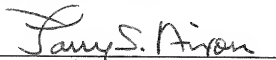
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In addition, as noted above, it is respectfully requested that claims 5 and 8-10
now be rejoined in view of the finding of allowance of four generic parent claims.

Respectfully submitted,

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